

# EXERCISES

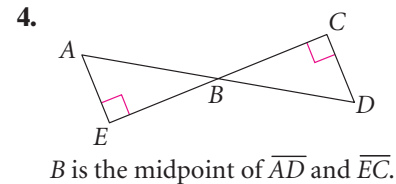
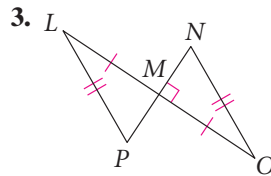
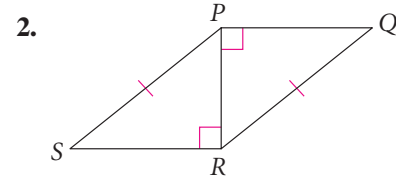
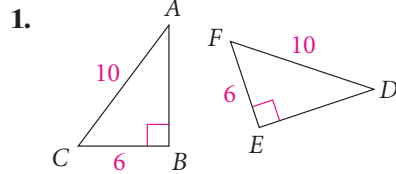
For more practice, see *Extra Practice*.

## Practice and Problem Solving

### A Practice by Example

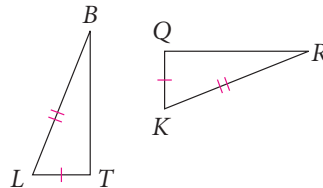
**Example 1**  
(page 218)

**Developing Proof** Write a short paragraph to explain why the two triangles are congruent.

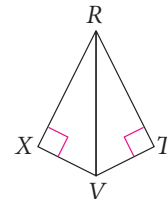


**Developing Proof** What additional information do you need to prove the triangles congruent by the HL Theorem?

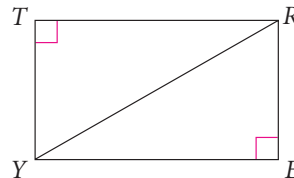
5.  $\triangle BLT$  and  $\triangle RKQ$



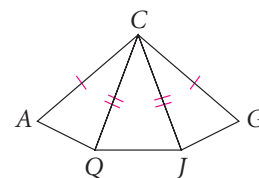
6.  $\triangle XRV$  and  $\triangle TRV$



7.  $\triangle TRY$  and  $\triangle EYR$

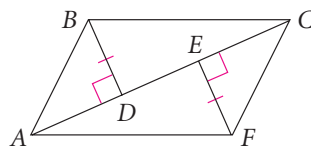


8.  $\triangle ACQ$  and  $\triangle GCJ$

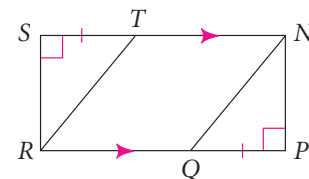


**Developing Proof** What additional information do you need to prove the triangles congruent by the HL Theorem?

9.  $\triangle BDC$  and  $\triangle FEA$



10.  $\triangle STR$  and  $\triangle PQN$

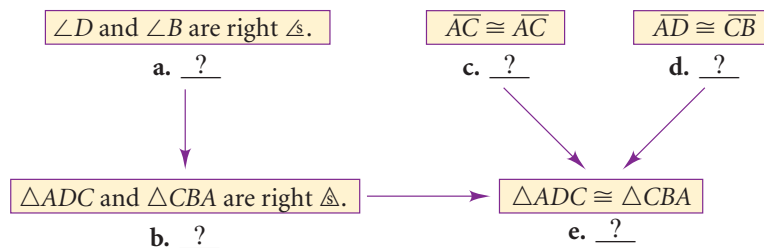
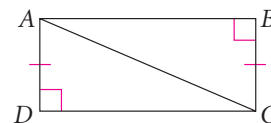


**Example 2**  
(page 218)

**Developing Proof** Complete each flow proof.

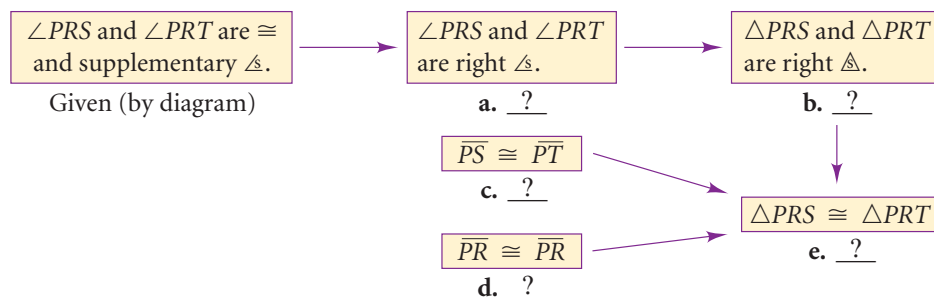
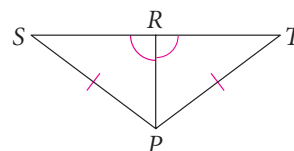
**11. Given:**  $\overline{AD} \cong \overline{CB}$ ,  $\angle D$  and  $\angle B$  are right angles.

**Prove:**  $\triangle ADC \cong \triangle CBA$



**12. Given:**  $\overline{PS} \cong \overline{PT}$ ,  $\angle PRS \cong \angle PRT$

**Prove:**  $\triangle PRS \cong \triangle PRT$

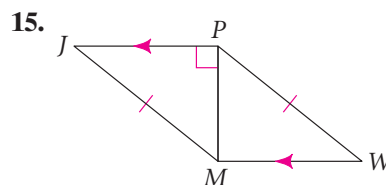
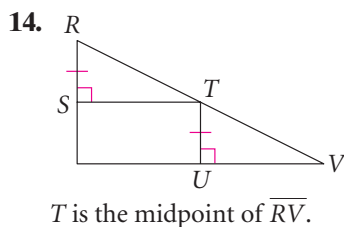


**Need Help?**

For Exercise 13, recall how to classify  $\triangle SPT$ . Then recall what is true about this type of triangle.

**13. Developing Proof** There is a different set of steps that will prove  $\triangle PRS \cong \triangle PRT$  in Exercise 12. Decide what they are. Then write a short paragraph to explain the steps.

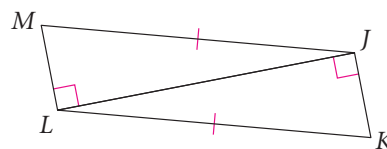
**Developing Proof** Tell whether the HL Theorem can be used to prove the two triangles congruent. If so, explain. If not, write *not possible*.



**Example 3**  
(page 219)

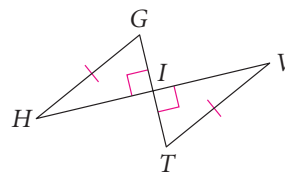
**Developing Proof** Complete each two-column proof.

16. **Given:**  $\overline{JL} \perp \overline{LM}$ ,  $\overline{LJ} \perp \overline{JK}$ ,  $\overline{MJ} \cong \overline{KL}$   
**Prove:**  $\triangle JLM \cong \triangle LJK$



Statements	Reasons
1. $\overline{JL} \perp \overline{LM}$ and $\overline{LJ} \perp \overline{JK}$	a. ?
2. $\angle JLM$ and $\angle LJK$ are right angles.	b. ?
c. ?	3. Definition of a right triangle
4. $\overline{MJ} \cong \overline{KL}$	d. ?
e. ?	5. Reflexive Property of Congruence
6. $\triangle JLM \cong \triangle LJK$	f. ?

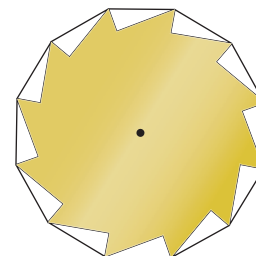
17. **Given:**  $\overline{HV} \perp \overline{GT}$ ,  $\overline{GH} \cong \overline{TV}$ ,  
 $I$  is the midpoint of  $\overline{HV}$ .  
**Prove:**  $\triangle IGH \cong \triangle ITV$



Statements	Reasons
1. $\overline{HV} \perp \overline{GT}$ , $\overline{GH} \cong \overline{TV}$	a. ?
b. ? and $\triangle ITV$ are right triangles.	c. ?
d. ?	3. Given
4. $\overline{HI} \cong \overline{VI}$	e. ?
f. ?	5. HL Theorem

**B Apply Your Skills**

18. **Antiques** To repair an antique clock, a 12-toothed wheel has to be made by cutting right triangles out of a regular polygon that has twelve 4-cm sides. The hypotenuse of each triangle is a side of the regular polygon, and the shorter leg is 1 cm long. Explain why the 12 triangles must be congruent.

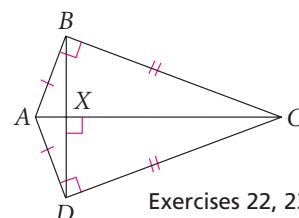


- x<sup>2</sup> Algebra** In Exercises 19 and 20, for what values of  $x$  and  $y$  are the triangles congruent by HL?

19. 20.

21. **Critical Thinking** While working for a landscape architect, you are told to lay out a flower bed in the shape of a right triangle with sides of 3 yd and 7 yd. Explain what else you need to know in order to make the flower bed.

22. **Reasoning** Polygon  $ABCD$  has  $AB = AD$ ,  $BC = DC$ , and right angles as marked. Name all the pairs of congruent right triangles in the figure. Explain why each pair is congruent.



23. **Developing Proof** You are given what is shown in the figure, except for the right angle at  $X$ , and you are asked to prove that  $\angle AXD$  is a right angle.

- a. **Writing** Explain how you could complete the proof without using HL.  
b. Write a paragraph proof that  $\angle AXD$  must be a right angle.

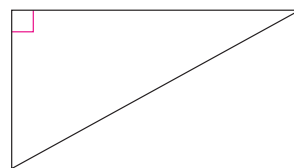
**Constructions** Copy the triangle and construct a triangle congruent to it using the method stated.

24. by SAS

25. by HL

26. by ASA

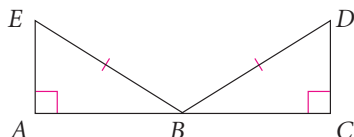
27. by SSS



**Proof** Write a flow proof or a two-column proof.

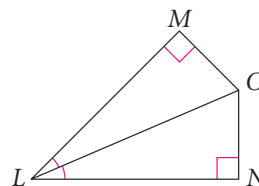
28. **Given:**  $\overline{EB} \cong \overline{DB}$ ,  $\angle A$  and  $\angle C$  are right angles, and  $B$  is the midpoint of  $\overline{AC}$ .

**Prove:**  $\triangle BEA \cong \triangle BDC$



29. **Given:**  $\overline{LO}$  bisects  $\angle MLN$ ,  $\overline{OM} \perp \overline{LM}$ , and  $\overline{ON} \perp \overline{LN}$ .

**Prove:**  $\triangle LMO \cong \triangle LNO$



30. **Open-Ended** You are the DJ for the school dance. To set up, you have placed one speaker in the corner of the platform. What measurement(s) could you make with a tape measure to make sure that a matching speaker is in the other corner at exactly the same angle? Explain why your method works.

31. a. **Coordinate Geometry** Use grid paper. Graph the points  $E(-1, -1)$ ,  $F(-2, -6)$ ,  $G(-4, -4)$ , and  $D(-6, -2)$ . Connect the points with segments.

b. Find the slope for each of  $\overline{DG}$ ,  $\overline{GF}$ , and  $\overline{GE}$ .

c. Use your answer to part (b) to describe  $\angle EGD$  and  $\angle EGF$ .

d. Use the Distance Formula to find  $DE$  and  $FE$ .

e. Write a paragraph to prove that  $\triangle EGD \cong \triangle EGF$ .

32. **Critical Thinking** “A HA!” exclaims Francis. “There is an HA Theorem . . . , something like the HL Theorem!” Explain what Francis is saying and why he is correct or incorrect.



**Challenge**

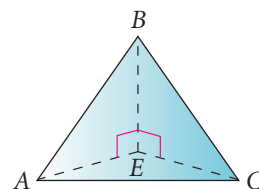
**Geometry in 3 Dimensions** Use the figure at the right for Exercises 33 and 34.

**Proof** 33. Write a paragraph proof.

**Given:**  $\overline{BE} \perp \overline{EA}$ ,  $\overline{BE} \perp \overline{EC}$ ,  $\triangle ABC$  is equilateral.

**Prove:**  $\triangle AEB \cong \triangle CEB$

34. **Given:**  $\triangle AEB \cong \triangle CEB$ ,  $\overline{BE} \perp \overline{EA}$ , and  $\overline{BE} \perp \overline{EC}$ . Can you prove that  $\triangle ABC$  is equilateral? Explain.





## Standardized Test Prep

### Multiple Choice

In Exercises 35 and 36, which additional congruence statement could you use to prove that  $\triangle BJK \cong \triangle CFH$  by HL?

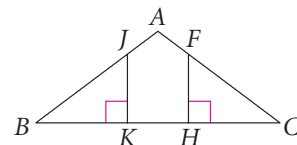
35. Given:  $\overline{BJ} \cong \overline{CF}$

A.  $\overline{JK} \cong \overline{FH}$

B.  $\angle B \cong \angle C$

C.  $\overline{AJ} \cong \overline{AF}$

D.  $\angle BJK \cong \angle CFH$



36. Given:  $\overline{BK} \cong \overline{CH}$

F.  $\overline{JK} \cong \overline{FH}$

G.  $\angle B \cong \angle C$

H.  $\overline{JB} \cong \overline{FC}$

I.  $\angle BJK \cong \angle CFH$

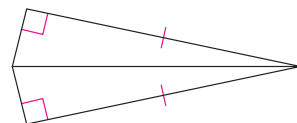
37. Which congruence statement can be used to prove that the two triangles are congruent?

A. SAS

B. SSS

C. ASA

D. HL



### Short Response



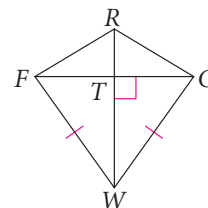
#### Take It to the NET

Online lesson quiz at  
[www.PHSchool.com](http://www.PHSchool.com)

Web Code: afa-0406

38. a. Use the diagram at the right to name all the pairs of triangles you could prove congruent by using the HL Theorem.

b. Suppose you need to prove  $\triangle RFW \cong \triangle RGW$ . What specifically do you need to prove before you can use the HL Theorem?



## Mixed Review

### Lesson 4-5

For Exercises 39 and 40, what type of triangle must  $\triangle XYZ$  be?

39.  $\triangle XYZ \cong \triangle ZYX$

40.  $\triangle XYZ \cong \triangle ZXY$

### Lesson 3-6

41. Connect  $A(3, 3)$ ,  $B(5, 5)$ ,  $C(9, 1)$ , and  $D(9, -3)$  in order. Are any sides of the figure parallel? Are any sides perpendicular? Explain.

### Lesson 3-1

State the postulate or theorem that justifies each statement.

42.  $\angle 5 \cong \angle 8$

43.  $m\angle 4 + m\angle 8 = 180$

44.  $\angle 6 \cong \angle 9$

45.  $\angle 4 \cong \angle 10$

46.  $\angle 1 \cong \angle 6$

47.  $\angle 6$  and  $\angle 3$  are supplementary.

